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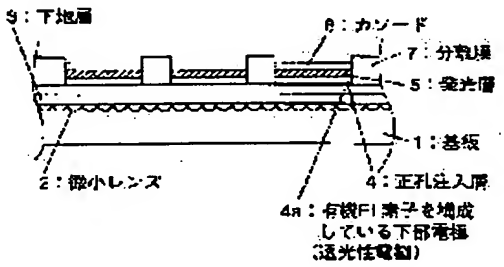
(54) ORGANIC ELECTROLUMINESCENCE ELEMENT, DISPLAY DEVICE OR LIGHT-EMITTING SOURCE USING THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic EL element which takes out light in the direction of the substrate side of the translucent substrate and in which the emission taking-out efficiency is stabilized and improved and which has a high luminance when seen from the front and a high quality without color blurring.
SOLUTION: The organic EL element comprises a substrate, plural light angle changing means that are provided on one face of the substrate, and one or plural organic EL elements that are provided directly or through a ground layer on one face of the above substrate, and the organic EL element has the above organic EL elements as a light-emitting source and the above substrate side is made as a light taking-out side. Plural pieces of light angle changing means are provided for each of the above one or plural organic EL elements.



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CLAIMS

[Claim(s)]
[Claim 1] The organic electroluminescence light emitting device which is one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of a substrate and said substrate equipped with the conversion means whenever [two or more optic angle], and is characterized by establishing the conversion means whenever [two or more optic angle] to each of said one piece or two or more organic electroluminescence light emitting devices.
[Claim 2] The organic electroluminescence light emitting device according to claim 1 characterized by forming the conversion means in said organic electroluminescence light emitting device side of said substrate whenever [said optic angle].
[Claim 3] A conversion means is claim 1 and the organic electroluminescence light emitting device given [any 1] in two which are characterized by being a microlens, minute prism, or a light reflex layer whenever [two or more optic angle].
[Claim 4] The organic electroluminescence light emitting device which is one piece or two or more organic electroluminescence light emitting devices which were equipped with the conversion means a substrate and whenever [two or more optic angle], and which were prepared through the direct or substrate layer on one side of said substrate by making a substrate side into an optical ejection side, and is characterized by establishing the conversion means whenever [at least 2 or more kinds of optic angle] to each of said one piece or two or more organic electroluminescence light emitting devices.
[Claim 5] A conversion means is an organic electroluminescence light emitting device according to claim 4 characterized by being the stratified matter which combined the ingredient with at least two or more kinds of different refractive indexes whenever [two or more optic angle].
[Claim 6] A conversion means is claim 4 and the organic electroluminescence light emitting device given [any 1] in five which are characterized by being the stratified matter which combined the ingredient a in which at least one has a bigger refractive index than the lower electrode of translucency, and the ingredient b in which other at least one has a larger and refractive index smaller than said ingredient a than the lower electrode of translucency whenever [two or more optic angle].
[Claim 7] In a substrate and the organic electroluminescence light emitting device equipped with the conversion means whenever [optic angle] Said substrate or a substrate layer is translucency, and the conversion means is established in said substrate or the substrate layer whenever [optic angle / which consists of the transparence matter with which a refractive index differs from said substrate, an opaque particle, or an air space]. They are one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of said substrate by making a substrate side into an optical ejection side. A conversion means is said transparence matter, said opaque particle, or an organic electroluminescence light emitting device characterized by the longitudinal direction of the appearance of said air space being suitable in the thickness direction of said substrate whenever [said optic angle].
[Claim 8] In a substrate and the organic electroluminescence light emitting device equipped with

the conversion means whenever [optic angle] Said substrate or a substrate layer is translucency, and the conversion means is established in said substrate or the substrate layer whenever [optic angle / which consists of the transparence matter with which a refractive index differs from said substrate, an opaque particle, or an air space]. They are one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of said substrate by making a substrate side into an optical ejection side. A conversion means is said transparence matter, said opaque particle, or an organic electroluminescence light emitting device claim 1 characterized by the longitudinal direction of the appearance of said air space being suitable in the thickness direction of said substrate - given [any 1] in six whenever [said optic angle].

[Claim 9] The organic electroluminescence display characterized by dividing the lower electrode of translucency into an individual electrical-and-electric-equipment target in the shape of a stripe, separating into an individual electrical-and-electric-equipment target in the shape of a stripe, constituting a cathode using an organic electroluminescent element claim 1 - given [any 1] in eight, and having an image display array.

[Claim 10] It is the organic electroluminescence display according to claim 9 which it separates into an individual electrical-and-electric-equipment target, and the lower electrode of said translucency or either of said cathodes is constituted, and said separated electrode is scanned through at least one or more switching elements, and is characterized by having an image display array.

[Claim 11] The source of organic electroluminescence luminescence characterized by dividing the lower electrode of translucency into an individual electrical-and-electric-equipment target in the shape of a stripe, separating into an individual electrical-and-electric-equipment target in the shape of a stripe, constituting a cathode using an organic electroluminescent element claim 1 - given [any 1] in eight, and having an image display array.

[Claim 12] It is the source of organic electroluminescence luminescence according to claim 11 which it separates into an individual electrical-and-electric-equipment target, and the lower electrode of said translucency or either of said cathodes is constituted, and said separated electrode is scanned through at least one or more switching elements, and is characterized by having an image display array.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the display which used the organic electroluminescence light emitting device (it outlines as an organic electroluminescence light emitting device hereafter), and the organic EL device, or the source of reading luminescence and the source of write-in luminescence which is mainly a printer.
[0002]
[Description of the Prior Art] An organic electroluminescence light emitting device is a spontaneous light corpuscle child, and has a big advantage, like low-power-ization can be attained compared with inorganic EL light emitting device with high visibility. Development is actively furthered for the purpose of the use made into the pixel of displays, such as a display panel, or the surface light source. When using an organic electroluminescence light emitting device as a pixel, a request is displayed by arranging two or more organic electroluminescence light emitting devices to the same plane, constituting in a matrix wiring which impresses an electrical potential difference, and making it drive independently. Moreover, since the surface light source can be constituted from shape of a thin film, miniaturization and lightweight-ization can be easily attained by using for the component equipped with sources of luminescence, such as the reading light source of a printer, and the write-in light source, or equipment.
[0003] Generally the organic electroluminescence light emitting device which has the above features is created through a direct or substrate layer on a translucency substrate like a glass substrate, and makes this translucency substrate side the optical ejection side. Although a substrate layer is used in order [for Na pollution control from a substrate front face] to make good surface roughness of the covering side at the time of forming the lower electrode of translucency (field granularity is made small) when a soda glass substrate etc. is used, it is not necessarily required. It is known that optical ejection effectiveness (the total amount of luminescence from the quantity of light / organic electroluminescence light emitting device which can be taken out from an optical ejection side) will become about 1/(2n2) (n is the refractive index of an organic luminous layer) by the total reflection in respect of optical ejection in the organic electroluminescence light emitting device which makes such an organic electroluminescence light emitting device the source of luminescence, and the attempt of the versatility which raises optical ejection effectiveness is made.
[0004] Moreover, the light emitted from an organic electroluminescence light emitting device is the diffused light, and when using as a pixel of a display, the brightness when seeing from a transverse plane by total reflection, as mentioned above, since it is that optical ejection effectiveness is low becomes low.
[0005] Preparing the lens for condensing between a translucency substrate and the lower electrode which constitutes the organic electroluminescence light emitting device, so that it may correspond on [1 to 1] an organic electroluminescence light emitting device and plane view is indicated by JP,10-172756,A. The thing here "an organic electroluminescence light emitting device and the lens for condensing correspond on [1 to 1] plane view" is filling the following (a) and (b).

[0006] (a) One organic electroluminescence light emitting device laps only with one lens for condensing, and the optical axis of the lens for condensing and its core on the plane view of an organic electroluminescence light emitting device correspond substantially.
[0007] (b) The magnitude of an organic electroluminescence light emitting device is below the magnitude inscribed in still more preferably below the magnitude that laps mutually preferably below the magnitude circumscribed to the lens for condensing which has lapped with the organic electroluminescence light emitting device concerned.
[0008] Since more light parallel to the optical axis of the lens for condensing can be obtained by this, an organic electroluminescence light emitting device with the high brightness when seeing from a transverse plane can obtain.
[0009] Moreover, forming an organic electroluminescence light emitting device on one [which has the micro-lens array structure made from plastics] plate surface of a substrate is indicated by JP,10-223367,A. "Micro-lens array structure" here is a cross-section radii configuration, and should just be a convex lens-like for condensing. Since the luminescence beam of light of a light-emitting part is condensed by this at the heights of a micro-lens array, quantity brightness-ization can be attained, and since it is a product made from plastics, lightweight-izing is possible.

[0010]
[Problem(s) to be Solved by the Invention] The ejection effectiveness of light can be raised by creating an organic electroluminescence light emitting device according to the contents indicated by above-mentioned JP,10-172756,A. Here, drawing 12 is the sectional view of the conventional organic electroluminescence light emitting device, and drawing 13 is the expanded sectional view of the conventional organic electroluminescence light emitting device. In addition, drawing 12 is the typical drawing of the above-mentioned official report. Although surely the ejection effectiveness of light can be raised by the organic electroluminescence light emitting device given [above-mentioned] in an official report, when one lens 52 for condensing is formed corresponding to one component as shown in drawing 13 for example, since an organic electroluminescence light emitting device is not the one point light source but the surface light source, EL light which carries out incidence to a lens by the optical path diffused without the ability condensing surely produces it. Moreover, even if it forms one prism corresponding to one component, EL light which carries out incidence to a lens by the optical path diffused without the ability condensing surely arises similarly. About the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane, there is room which can improve to what has the still better engine performance. drawing 12 and 13 -- setting -- 50 -- organic electroluminescence luminescence equipment -- it is -- 51 -- a substrate and 52 -- for a hole-injection layer and 54a, as for a luminous layer and 56, a lower electrode layer and 55 are [the lens for condensing, and 53 / a substrate layer and 54 / a cathode and 57] detached cores. [in addition,] And organic electroluminescence luminescence equipment 50 is the configuration that the lens 52 for condensing was formed in the substrate 51, lower electrode 54a was formed through the substrate layer 53, the laminating of the hole-injection layer 54, a luminous layer 55, and the cathode 56 was carried out to this, and each component was separated by the detached core 57.
[0011] Moreover, the ejection effectiveness of light can be raised by creating an organic electroluminescence light emitting device according to the contents indicated by JP,10-223367,A. Here, drawing 14 is the sectional view of the conventional organic electroluminescence light emitting device, and drawing 15 and 16 are the expanded sectional views of the conventional organic electroluminescence light emitting device. In addition, drawing 14 is the typical drawing of the above-mentioned official report. Although surely the ejection effectiveness of light can be raised by the organic electroluminescence light emitting device given [above-mentioned] in an official report, even if it prepares lens section 61a for condensing for the light which carried out incidence to the substrate 61 from the light-emitting part 63 of an organic electroluminescence light emitting device in a substrate 61 side and raises optical ejection effectiveness, as shown in drawing 15 , when the refractive index of a substrate 61 differs from the lens ingredient of a lens 62, the light which carries out total reflection of the inside of a

substrate, and spreads it cannot be taken out. Moreover, as shown in drawing 1616 , even when the substrate 61 is constituted from a lens ingredient, EL light which carries out incidence to lens section 61a by the optical path diffused without the ability condensing surely arises. In addition, in drawing 14 , and 15 and 16, 61 is the light-emitting part of a substrate and the organic electroluminescence light emitting device which 61a equipped with the luminous layer by which the lens section and 62 were inserted into the lens and 63 was inserted into the anode and the cathode.

[0012] And the purpose of this invention is offering the organic electroluminescence light emitting device which can obtain the quality thing which stability and whose brightness when seeing from a transverse plane while making it improve are high, and does not have a color blot in the optical ejection effectiveness of the organic electroluminescence light emitting device equipped with the organic electroluminescence light emitting device as a source of luminescence.

[0013]

[Means for Solving the Problem] The organic electroluminescence light emitting device of this invention which attains the above-mentioned purpose is one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on a conversion means and one side of a substrate whenever [two or more optic angle / which were established on one side of a substrate and a substrate], and is considered as the configuration in which the conversion means is formed whenever [two or more optic angle] to each of one piece or two or more organic electroluminescence light emitting devices.

[0014] In addition, the organic electroluminescence light emitting device of this invention does not need to limit the optical ejection side to a substrate side (an organic EL device and opposite side), may change the include angle of light with a conversion means whenever [concerned optic angle], and it may constitute it so that substrate thickness and perpendicular direction (substrate end-face side) ** may become the direction of optical ejection the cathode side of an organic EL device.

[0015] Furthermore, whenever [two or more optic angle / which were established on one side of a substrate and a substrate], the organic electroluminescence light emitting device of this invention is a conversion means, one piece prepared through the direct or substrate layer on one side of a substrate by making a substrate side into an optical ejection side, or two or more organic electroluminescence light emitting devices, and is considered as the configuration in which the conversion means is formed whenever [at least 2 or more kinds of optic angle] to each of one or more organic electroluminescence light emitting devices.

[0016] Furthermore, the organic electroluminescence light emitting device of this invention is one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of a substrate by making a substrate and substrate side into an optical ejection side. A substrate or a substrate layer is translucency, and it is the organic electroluminescence light emitting device which has established the conversion means in the substrate or the substrate layer whenever [optic angle / which said substrate becomes from the transparence matter, opaque particle, or air space from which a refractive index differs]. The longitudinal direction of the appearance of the transparence matter, an opaque particle, or an air space considers a conversion means as the configuration which is suitable in the thickness direction of said substrate whenever [optic angle].

[0017]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail.

[0018] Invention according to claim 1 is one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on a conversion means and one side of a substrate whenever [two or more optic angle / which were established on one side of a substrate and a substrate], and is an organic electroluminescence light emitting device characterized by establishing the conversion means whenever [two or more optic angle] to each of one piece or two or more organic electroluminescence light emitting devices.

[0019] If according to this configuration two or more lenses for condensing are prepared

corresponding to one component for the configuration of this invention among the light in which the organic electroluminescence light emitting device which is the surface light source emits light as shown in drawing 1 , since the probability which produces EL light which carries out incidence to a lens by the optical path diffused without the ability condensing can be reduced, about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane, it can improve to what has the still better engine performance.

[0020] In addition, the organic electroluminescence light emitting device of this invention may be constituted so that it is not necessary to limit the optical ejection side to a substrate side (an organic electroluminescence light emitting device and opposite side), and the include angle of light may be changed with a conversion means whenever [concerned optic angle], for example, substrate thickness and perpendicular direction ** may become the direction of optical ejection the cathode side of an organic electroluminescence light emitting device. When making a cathode side into an optical ejection side, the light spread in the direction of a lower electrode of translucency from a luminous layer is condensed to a luminous layer side with a conversion means whenever [concerned optic angle], and it can take out from a luminous layer in accordance with the light spread in the direction of [other than the direction of a lower electrode of translucency]. In this case, since the total reflection conditions by the side of the substrate of a substrate are avoidable, optical ejection effectiveness can be raised.

[0021] Invention according to claim 2 is an organic electroluminescence light emitting device according to claim 1, and is characterized by forming the conversion means in the organic electroluminescence light emitting device side of a substrate whenever [optic angle].

[0022] Although the light which carries out total reflection of the inside of a substrate, and spreads it exists as shown in drawing 15 explained by the Prior art among the light in which an organic electroluminescence light emitting device emits light when the refractive index of a substrate and a lens ingredient is different, the light which carries out total reflection of the inside of a substrate, and spreads it can be reduced by forming a conversion means in the organic electroluminescence light emitting device side of a substrate whenever [optic angle]. Moreover, since two or more lenses are made to correspond to one organic electroluminescence light emitting device as shown in drawing 2 even when a lens ingredient is used as a substrate, the probability to produce EL light which carries out incidence to a lens by the optical path diffused without the ability condensing can be reduced, and it can improve to what has the still better engine performance about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane.

[0023] Invention according to claim 3 is characterized by being an organic electroluminescence light emitting device according to claim 1, and being the microlens, minute prism, or light reflex layer which is a conversion means whenever [optic angle].

[0024] For example, since the probability which produces EL light which carries out incidence to a lens by the optical path diffused without the ability condensing by forming minute prism in the organic electroluminescence light emitting device side of a substrate can be reduced as shown in drawing 4 , about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane, it can improve to what has the still better engine performance.

[0025] Moreover, you may constitute so that it is not necessary to limit an optical ejection side to a substrate side (an organic electroluminescence light emitting device and opposite side), and the include angle of light may be changed with a conversion means whenever [concerned optic angle], for example, the cathode side of an organic electroluminescence light emitting device, or substrate thickness and a perpendicular direction may turn into the direction of optical ejection. Since the light spread in the direction of a lower electrode of translucency from a luminous layer is condensed to a luminous layer side when making a cathode side into an optical ejection side, in accordance with the light spread in the direction of [other than the direction of a lower electrode of translucency], it can take out from a luminous layer using a conversion means whenever [optic angle / which formed a light reflex layer, a microlens, or minute prism in order on the substrate]. In this case, since the total reflection conditions by the side of the substrate

of a substrate are avoidable, optical ejection effectiveness can be raised.
[0026] Invention according to claim 4 whenever [two or more optic angle / which were established on one side of a substrate and a substrate] A conversion means, They are one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of a substrate by making a substrate side into an optical ejection side. It is the organic electroluminescence light emitting device characterized by establishing the conversion means whenever [at least 2 or more kinds of optic angle] to each of one piece or two or more organic electroluminescence light emitting devices.
[0027] Although the organic electroluminescence light emitting device which formed the conversion means in drawing 6 whenever [2 kinds of optic angle] is shown, whenever [optic angle / of incident light] is changed so that a total reflection beam of light may not produce a detail in the interface of a substrate and air with the conversion means 1 whenever [optic angle], as shown in drawing 7 . Since incidence of the light which carried out incidence to the conversion means 2 whenever [optic angle] is carried out to the conversion means 1 whenever [optic angle / with a more large refractive index], light comes to guide waves for the conversion means 1 whenever [optic angle], and a great portion of light is changed into whenever [optic angle / which a total reflection beam of light does not produce in the interface of a substrate and air] as a result. Thus, by using a conversion means whenever [at least 2 or more kinds of optic angle], it can improve to what has the still better engine performance about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane.
[0028] Invention according to claim 5 is an organic electroluminescence light emitting device according to claim 4, and it is characterized by a conversion means being the stratified matter which combined the ingredient with which at least two or more kinds of refractive indexes are different whenever [two or more optic angle].
[0029] Moreover, invention according to claim 6 is claim 4 and an organic electroluminescence light emitting device given [any 1] in five, and a conversion means is characterized by being the stratified matter which combined the ingredient a in which at least one has a bigger refractive index than the lower electrode of translucency, and the ingredient b in which other at least one has a larger and refractive index smaller than Ingredient a than the lower electrode of translucency whenever [two or more optic angle].
[0030] Although the organic electroluminescence light emitting device which formed the conversion means in drawing 7 whenever [2 kinds of optic angle] is shown, if the refractive index of the conversion means 2 is set [whenever / substrate and optic angle] to n1, n2, and n3 whenever [conversion means 1 and optic angle], respectively, an ingredient which is set to n2>n1 and n3 will be chosen. In addition, being set to n2>n1>n3 is still more desirable. It is more desirable for the refractive index n2 of the conversion means 1 to be [whenever / optic angle] larger than lower electrode 24a of translucency. Moreover, it is still more desirable if the refractive index n3 of the conversion means 2 is [whenever / optic angle] larger than lower electrode 24a of translucency. And by forming in the shape of a layer combining two or more kinds of ingredients with which this refractive index is different, surface roughness of a lower electrode is made small good, and a substrate layer may be formed on this, and surface roughness may be further made small. Thus, about the brightness when not reducing the luminescence stability of an organic electroluminescence light emitting device, and seeing an organic electroluminescence light emitting device from a transverse plane, it can improve to what has the still better engine performance.
[0031] Invention according to claim 7 is one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of a substrate and a substrate. A substrate or a substrate layer is translucency, and it is the organic electroluminescence light emitting device which has established the conversion means in the substrate or the substrate layer whenever [optic angle / which a substrate becomes from the transparence matter, opaque particle, or air space from which a refractive index differs]. A conversion means is the transparence matter, an opaque particle, or an organic electroluminescence light emitting device characterized by the longitudinal direction of the

appearance of an air space being suitable in the thickness direction of a substrate whenever [optic angle].

[0032] If the transparence matter, the opaque matter, or an air space is prepared so that x and y of the dimension may turn into x>y in a substrate as shown in drawing 10 for example, since include-angle conversion comes to be carried out mainly in the x directions, light can improve to what has the still better engine performance about the brightness when seeing an organic electroluminescence light emitting device from a transverse plane.

[0033] Invention according to claim 8 is an organic electroluminescence light emitting device given in claims 1-6. A substrate, In one piece or two or more organic electroluminescence light emitting devices which were prepared through the direct or substrate layer on one side of a substrate by making a substrate side into an optical ejection side A substrate or a substrate layer is translucency, and it is the organic electroluminescence light emitting device which has established the conversion means in the substrate or the substrate layer whenever [optic angle / which a substrate becomes from the transparence matter, opaque particle, or air space from which a refractive index differs]. A conversion means is characterized by the longitudinal direction of the appearance of the transparence matter, an opaque particle, or an air space being suitable in the thickness direction of a substrate whenever [optic angle].

[0034] And since the effect of the invention according to claim 7 with which it mentioned above, and an effect of the invention given in claims 1-6 may be considered independently, about the brightness when seeing an organic electroluminescence light emitting device from a transverse plane, it can improve still by leaps and bounds by combining these to what has the good engine performance.

[0035] As for invention according to claim 9, the lower electrode of translucency is divided into an individual electrical-and-electric-equipment target in the shape of a stripe. Separated into the individual electrical-and-electric-equipment target in the shape of a stripe, and the cathode was constituted, and used the organic electroluminescent element according to claim 1 to 8 characterized by having an image display array. It is an organic electroluminescence display, and since the optical ejection effectiveness inside a component can be raised, it excels in visibility, and it is possible to maintain the efficient luminescence engine performance, and a good display with a simple matrix method can be performed.

[0036] Invention according to claim 10 is an organic electroluminescence display according to claim 9. The lower electrode of translucency, Either of said cathodes is divided into an individual electrical-and-electric-equipment target, and it is constituted and or the separated electrode By being scanned through at least one or more switching elements Since it is the organic electroluminescence display characterized by having an image display array and the optical ejection effectiveness inside a component can be raised, It excels in visibility, and it is possible to maintain the efficient luminescence engine performance, and a good display with an active-matrix method can be performed.

[0037] As for invention according to claim 11, the lower electrode of translucency is divided into an individual electrical-and-electric-equipment target in the shape of a stripe. Separated into the individual electrical-and-electric-equipment target in the shape of a stripe, and the cathode was constituted, and used the organic electroluminescent element according to claim 1 to 8 characterized by having an image display array. It is a source of organic electroluminescence luminescence, and since the optical ejection effectiveness inside a component can be raised, it excels in visibility, and it is possible to maintain the efficient luminescence engine performance, and a good display with a simple matrix method can be performed.

[0038] Invention according to claim 12 is a source of organic electroluminescence luminescence according to claim 11. The lower electrode of translucency, Either of the cathodes is divided into an individual electrical-and-electric-equipment target, and it is constituted and or the separated electrode By being scanned through at least one or more switching elements Since it is the source of organic electroluminescence luminescence characterized by having an image display array and the optical ejection effectiveness inside a component can be raised, It excels in visibility, and it is possible to maintain the efficient luminescence engine performance, and a good display with an active-matrix method can be performed.

[0039] (Gestalt 1 of operation) Drawing 1 is the sectional view showing the organic electroluminescence light emitting device in the gestalt 1 of operation of this invention. Drawing 2 R> 2 is the expanded sectional view showing the organic electroluminescence light emitting device in the gestalt 1 of operation of this invention, and shows the example of an optical path of the light which passes through the inside of the microlens of the plurality of drawing 1 . Drawing 3 is the expanded sectional view showing the organic electroluminescence light emitting device in the gestalt 1 of operation of this invention, and shows the example of a comparison of the optical path of the light in two or more microlenses and one lens. Drawing 4 is the sectional view showing other examples of the organic electroluminescence light emitting device in the gestalt 1 of operation of this invention, and shows the case where the microlens of drawing 1 is minute prism. Drawing 5 is the expanded sectional view showing other examples of the organic electroluminescence light emitting device in the gestalt 1 of operation of this invention, and shows the example of an optical path of the light which passes through the inside of the minute prism of the plurality of drawing 4 .

[0040] As shown in drawing 1 , the configuration of the organic electroluminescence light emitting device in the operation gestalt 1 of this invention is as follows. Two or more microlenses 2 are formed on the substrate layer 3 on a substrate 1 or in a substrate 1 or in the substrate layer 3. Lower electrode 4a of the translucency which constitutes the organic electroluminescence light emitting device on it, the hole-injection layer 4, the luminous layer 5, the cathode 6, and the demarcation membrane 7 are formed. An organic electroluminescence light emitting device can give off for the exterior EL light from the organic electroluminescence light emitting device which is a source of field luminescence through a substrate 1. And a great portion of light which carried out incidence to the microlens 2 from lower electrode 4a of translucency as shown in drawing 2 can be made to go in the condensing direction by setting up suitably the width of face of the microlens 2 prepared, and the refractive index of radius of curvature and a lens ingredient. [two or more]

[0041] Moreover, L1 and L2 show the optical path of the beam of light which carried out incidence to two or more microlenses 2 and the conventional one lens 2a from the same point emitting light to drawing 3 , respectively. In addition, it is an optical path when L1 carries out incidence to one of two or more of the microlenses 2, and is an optical path when L2 carries out incidence to the conventional one lens 2a. And as shown in drawing 3 , when it becomes easy to attach an include angle to the thickness direction of a substrate 1 and the direction of L2 carries out outgoing radiation into air compared with L1, it turns out that it is easy to diffuse the optical path of L2. Therefore, when a certain distance is kept from a substrate 1 and a luminescence condition is seen, it turns out that it is easy to diffuse light. Therefore, when the case where one lens 2a is prepared to one organic electroluminescence light emitting device, and two or more microlenses 2 are formed, brightness when latter one sees from a transverse plane more can be improved. Furthermore, since there is much alternative of lens width of face and radius of curvature, a more suitable design is possible.

[0042] Moreover, as shown in drawing 4 , two or more minute prism 2bs may be prepared on the substrate layer 3 on a substrate 1 or in a substrate 1 or in the substrate layer 3. And as shown in drawing 5 , since include-angle conversion is carried out in the condensing direction toward the substrate 1 side which is an ejection side compared with the case where there is no minute prism 2b, the light which carried out incidence from lower electrode 4a of translucency can improve to what has the still better engine performance about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane.

[0043] (Gestalt 2 of operation) Drawing 6 is the sectional view showing the organic electroluminescence light emitting device in the gestalt 2 of operation of this invention. Drawing 7 R> 7 is the expanded sectional view showing the organic electroluminescence light emitting device in the gestalt 2 of operation of this invention, and shows the example of an optical path of the light which passes through the inside of a conversion means whenever [2 kinds of drawing 6 of optic angle].

[0044] The configuration of the organic electroluminescence light emitting device in the gestalt 2 of operation of this invention is as follows. The conversion means 22 is formed whenever [2

kinds of optic angle] on the substrate layer 23 on a substrate 21 or in a substrate 21 or in the substrate layer 23. Lower electrode 24a of the translucency which constitutes the organic electroluminescence light emitting device on it, the hole-injection layer 24, the luminous layer 25, the cathode 26, and the demarcation membrane 27 are formed. In addition, the conversion means 22 is equipped [whenever / optic angle] with the conversion means 2 whenever [conversion means 1 and optic angle], and, as for 22a, the conversion means 1 and 22b show [whenever / optic angle / whenever / optic angle] the conversion means 2 whenever [optic angle] in drawing 6 .

[0045] An organic electroluminescence light emitting device can give off for the exterior EL light from the organic electroluminescence light emitting device which is a source of field luminescence through a substrate 21. an organic electroluminescence light emitting device -- emitting light -- lower electrode 24a of translucency -- ** -- the light which carried out incidence to the conversion means 1 whenever [optic angle] first among the light which carries out incidence to a substrate 21 later on is changed into an include angle which a total reflection beam of light does not produce in the interface of a substrate 21 and air. Incidence of the light which carries out outgoing radiation from lower electrode 24a of translucency is altogether carried out in the conversion means 1 direction whenever [optic angle / with a more high refractive index]. It is changed into whenever [optic angle / from which light comes to guide a conversion means 1 whenever / optic angle / as a result since re-incidence of the light which the area numerical aperture which counters lower electrode of translucency 24a carries out / whenever / optic angle / incidence to the conversion means 2 whenever / smaller than conversion means 1 optic angle /, and include-angle conversion is carried out, and carries out outgoing radiation carries out to the conversion means 1 whenever / more large / of a refractive index / optic angle /, and a total-reflection beam of light does not produce a great portion of light in the interface of a substrate and air].

[0046] Moreover, when the interface S of the conversion means 2 is [whenever / optic angle] the diffusing surface whenever [conversion means 1 and optic angle], the light which carries out incidence to the optical conversion means 1 from the conversion means 2 whenever [optic angle] is scattered about, and becomes easy to guide the conversion means 1 interior in the direction of a substrate whenever [optic angle]. It is not necessary to necessarily damage said interface S, and as much light as possible should just guide it in the direction of a substrate whenever [optic angle] depending on the conversion means 1 and how to combine the configuration of the conversion means 2 whenever [optic angle].

[0047] Although drawing 8 is the expanded sectional view showing the organic electroluminescence light emitting device in the gestalt 2 of operation of this invention and it is drawing which explains the dimension of the conversion means 2 whenever [optic angle], a conversion means can act more effectively that the depth lay length x and crosswise die-length y are x>y whenever [2 kinds of optic angle], and the light which goes in the direction of a substrate increases further.

[0048] Thus, by using a conversion means whenever [at least 2 or more kinds of optic angle], it can improve to what has the still better engine performance about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane.

[0049] (Gestalt 3 of operation) Drawing 9 is the sectional view showing the organic electroluminescence light emitting device in the gestalt 3 of operation of this invention. Drawing 1010 is an expanded sectional view showing the organic electroluminescence light emitting device in the gestalt 3 of operation of this invention, and shows the example of an optical path of the light which carries out incidence to the dimension of a conversion means whenever [optic angle / of drawing 9].

[0050] The configuration of the organic electroluminescence light emitting device in the gestalt 3 of operation of this invention is as follows. Lower electrode 34a of the translucency which constitutes the organic electroluminescence light emitting device, the hole-injection layer 34, the luminous layer 35, the cathode 36, and the demarcation membrane 37 are formed on the substrate 31 which arranged the light-scattering means 38, or the substrate layer 33. An organic electroluminescence light emitting device can take out for the exterior EL light from the organic

electroluminescence light emitting device which is a source of field luminescence from the optical ejection side 38 through a substrate 31. As shown in drawing 10 , include-angle conversion of the EL light which carries out incidence of the substrate depth lay length x of the light-scattering means 32 and the die-length y of a substrate longitudinal direction to the substrate 31 arranged so that it might become x>y is carried out whenever [optic angle] at the longitudinal direction (the depth direction of a substrate) of a conversion means. Since the light which carried out incidence to the substrate 31 from lower electrode 34a of translucency such when two or more conversion means were for example, in a substrate 31 whenever [optic angle] is suitable in the direction of an optical ejection side on the whole, it can improve to what has the still better engine performance about the brightness when seeing the organic electroluminescence light emitting device concerned from a transverse plane. That is, since total reflection in respect of optical ejection cannot happen easily, the light which carried out incidence from the organic EL device side of a substrate 31 when it was made x>y is taken out, and its effectiveness improves.

[0051] (Gestalt 4 of operation) Drawing 11 is the bird's-eye view showing the display in the gestalt 4 of the operation of this invention which used the organic electroluminescence light emitting device of the gestalten 1-3 of operation.

[0052] The configuration of the organic electroluminescence light emitting device in the gestalt 4 of operation of this invention is as follows. As shown in drawing 11 , patterning of the lower electrode 44a of translucency is carried out to the line, and patterning also of the cathode 46 is similarly carried out to this at the line in the form which carries out an abbreviation rectangular cross.

[0053] And lower electrode 44a of the translucency of this display is made into a cathode 46 minus-side a plus side, and if direct current voltage or a direct current is impressed to lower electrode 44a of the translucency connected and chosen as the drive circuit (driver) as a driving means which is not illustrated, and a cathode 46, the luminous layer 45 of the part which intersects perpendicularly emits light, and it can be used as a display of a simple matrix method. Moreover, in the gestalt of this operation, although the display of a simple matrix method was explained, the display of the active-matrix method driven by connecting with switching elements, such as TFT per piece [at least], at each of lower electrode 44a of the separated translucency is sufficient.

[0054]

[Example] Next, the example of this invention is explained.

[0055] This example shows the organic electroluminescence light emitting device equipped with the organic electroluminescence light emitting device as a source of luminescence.

[0056] (Example 1) As shown in drawing 1 , the hollow of a convex is prepared more sentimentally dirtily on a glass substrate at a substrate side. The configuration of a convex turns on a circular [at POJIREJISUTO], or substrate side when rectangular patterning is performed, this is made into a mask and UETTOETCHI is performed, as shown in drawing 1 , drawing 2 , or drawing 4 on a glass substrate at a detail. At this time, to one organic electroluminescence light emitting device, patterning is performed so that the circular number may become plurality. A spin coat is carried out so that a hollow may be buried here in the resist ingredient for micro lenses, and it bakes in 200-degree-C 30 minutes, a part for an organic solvent is flown, and a microlens is formed. Or depending on the aspect ratio of a convex configuration, deposition / embedding flattening of SiO2, SiON, SiO, SiN, Ta 2O5, etc. are carried out at low temperature CVD etc.

[0057] Next, although a transparent thin film is optically formed as a substrate layer all over this microlens top, there may not not necessarily be a substrate layer. As an ingredient of a substrate layer, fluorides, such as oxides, such as SiO2, aluminum 2O3, and MgO, TiO2, ZrO2, GeO2, and LiF, CaF2, AlF3, LaF3, etc. should just be insulating things.

[0058] Next, after forming the ITO film in the whole surface, on the ITO film, resist material (Tokyo adaptation shrine make, OFPR- 800) was applied with the spin coat method, the resist film with a thickness of 10 micrometers was formed, negatives were exposed and developed and patterning of the resist film was carried out to the mask and the configuration which is predetermined. Next, this substrate was immersed into 50% of hydrochloric acid at 60 degrees C,

after etching the ITO film of a part with which the resist film is not formed, the resist film was also removed and the patterning substrate with which the anode plate which consists of ITO film of a predetermined pattern was formed was obtained.
[0059] next, ultrasonic cleaning for [it twists this patterning substrate in a detergent (fruity chemistry company make and SEMIKO — clean)] 5 minutes — Ultrasonic cleaning for [it is based on pure water] 10 minutes, ultrasonic cleaning for [it is based on the solution which mixed hydrogen peroxide solution 1 and water 5 to aqueous ammonia 1 (volume ratio)] 5 minutes, After carrying out washing processing at the order of ultrasonic cleaning for [it is based on 70-degree C pure water] 5 minutes, by the nitrogen blower, the moisture adhering to a substrate was removed, and it heated further and dried.
[0060] Next, TPD was formed in the front face by the side of the anode plate of a patterning substrate by about 50nm thickness as a hole-injection layer within the resistance heating vacuum evaporationo component decompressed to the degree of vacuum of 2x10 to 6 or less Torrs.
[0061] Next, Alq3 was similarly formed by about 60nm thickness as a luminous layer on the hole-injection layer within the resistance heating vacuum evaporationo component. In addition, both the evaporation rates of TPD and Alq3 were 0.2 nm/s.
[0062] Next, cathode was similarly formed by 150nm thickness within the resistance heating vacuum evaporationo component by making into the source of vacuum evaporationo the aluminum-Li alloy which contains 15at(s)% Li on a luminous layer.
[0063] Thus, the organic electroluminescence light emitting device was created.
[0064] (Example 2) As shown in drawing 6 , the conversion means 2 is formed [whenever / optic angle] whenever [conversion means 1 and optic angle] on a glass substrate.
[0065] First, a transparent thin film is optically put on the whole surface, and the conversion means 1 is formed in it whenever [optic angle]. It buries by the resin which put the slot of a V character mold, a cone mold, or a pyramid mold into this, added the organic solvent for the interior of a slot to transparence or translucent resin and SiO2 particle, or TiO2 particle, and adjusted viscosity, and the conversion means 2 is formed whenever [optic angle]. An ingredient with the bigger refractive index as an ingredient of the optical thin film formed in the whole surface than the refractive index of a glass substrate is desirable. For example, the refractive index of a glass substrate is made about into 1.5, and insulating ingredients, such as fluorides, such as oxides, such as aluminum 2O3, MgO and Gd 2O3, Y2O3, Sc2O3, La2O3, ZrO2, SiO and Ta 2O5, and ZnO, TiO2, and LaF3, NdF3, CeF3, are mentioned. Next, although the slot of a V character mold is put in, you may put in using a V character mold blade configuration by the grinding machine, patterning of except for the part which becomes a slot is carried out to the rectangle by POJIREJISUTO, and even if it is wet or dry and etches, the shape of a quirk of a V character mold, a cone mold, or a pyramid mold is acquired. As the transparence which fills the interior of a slot, or translucent resin, the Pori polyethylene terephthalate, polycarbonate, polymethylmethacrylate, polyether sulfone, and vinyl fluoride, polypropylene, polyethylene, polyacrylate, amorphous polyolefine, etc. are mentioned. If the refractive index of the conversion means 2 is set [whenever / substrate and optic angle] to n1, n2, and n3 whenever [conversion means 1 and optic angle], respectively, an ingredient will be chosen so that it may be set to n2>n1 and n3.
[0066] Next, although a transparent thin film is optically formed as a substrate layer all over these two include-angle conversion means, there may not not necessarily be a substrate layer. As an ingredient of a substrate layer, fluorides, such as oxides, such as SiO2, aluminum 2O3, and MgO, TiO2, ZrO2, GeO2, and LiF, CaF2, AlF3, LaF3, etc. should just be insulating things.
[0067] With the same procedure as an example 1, the following created the organic electroluminescence light emitting device.
[0068] (Example 3) As shown in drawing 9 , a conversion means is formed in a glass substrate or a substrate layer whenever [optic angle / in which a refractive index differs from a substrate].
[0069] Whenever [optic angle], a conversion means makes it come to distribute the transparence matter or an opaque particle, and air foam, glass fiber, SiO2 particle, ZrO2 particle, a glass bead, a transparent plastic particle, etc. are mentioned as transparence matter. As an

opaque particle, carbon, SnO2, TiN, TiO2, etc. are mentioned. These transparence matter or opaque particles may be used together and used. For example, when creating the ingot which becomes a glass substrate, it may be made for air foam to blend suitably, and a glass bead, SiO2 particle, ZrO2 particle, etc. may be mixed. Moreover, what polyethylene terephthalate was made to distribute SnO2 particle, TiO2 particle, etc., and became a film sheet may be used as a substrate. The size of each particle is variously selectable from submicron ones to dozens of microns. If glass and plastics are made to mix air foam and it extends, it will be formed so that it may have a longitudinal direction in the direction which the air-space configuration extended. Moreover, it is not spherical, and a particle is created in a configuration which has a longitudinal direction, glass and plastics are mixed, a longitudinal direction is arranged, and a substrate is obtained.

[0070] Thus, the organic electroluminescence light emitting device was created with the procedure as an example 1 in which it is the same on the obtained substrate.

[0071] (Example 1 of a comparison) As shown in drawing 12 , the monotonous micro lens by which the lens is formed into the glass substrate by the ion-exchange method as a translucency substrate is prepared. The organic electroluminescence light emitting device was created with the procedure as an example 1 in which it is the same on this substrate.

[0072] Thus, drive the organic electroluminescence light emitting device of the acquired examples 1-3 and the example 1 of a comparison, it was made to emit light, and the evaluation test was carried out.

[0073] The test result is shown in (Table 1).

[0074]

[Table 1]

	発光効率	発光面視認性
実施例1	1．2～1．5	○
実施例2	1．2～1．5	○
実施例3	1．4～1．7	○
比較例1	1	△

[0075] Here, the evaluation approach in the evaluation criteria of (Table 1) and its valuation basis are explained. The luminous efficiency of a component evaluated the luminescence brightness when passing a fixed current to an organic electroluminescence light emitting device. Evaluation is a numeric value when making a substrate side into an optical ejection side, and shows the brightness when setting the luminescence brightness of the example 1 of a comparison to 1. The visibility of a luminescence side evaluated by viewing extent of the visibility when using an organic electroluminescence light emitting device as the display device which consists of a pixel of the square whose one side is 100 micrometers. evaluation is two-step evaluation of O and **, and the valuation basis O: is excellent -- it can do **:permission -- it comes out.

[0076] And it was checked that both the organic electroluminescence light emitting devices of the examples 1-3 of this invention are excellent in luminous efficiency and visibility compared with the conventional example 1 of a comparison so that more clearly than (Table 1).

[0077]

[Effect of the Invention] The organic electroluminescence light emitting device which can obtain the quality thing which stability and whose brightness when a substrate and cathode side being made with the direction of optical ejection, and seeing from the transverse plane while making it improve are high, and does not have a color blot in optical ejection effectiveness, the organic electroluminescence display using it, or the source of organic electroluminescence luminescence can be offered by the organic electroluminescence light emitting device of this invention as mentioned above.

[Translation done.]

JAPANESE [JP,2002-260845,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

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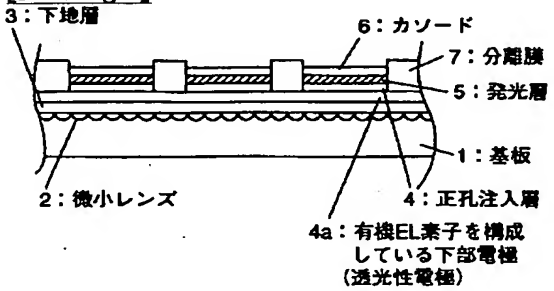
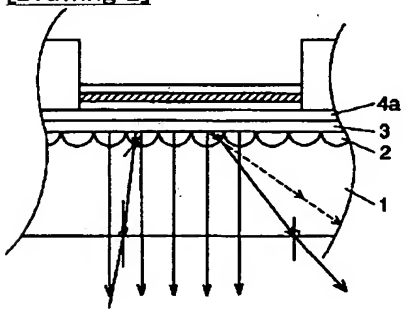
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

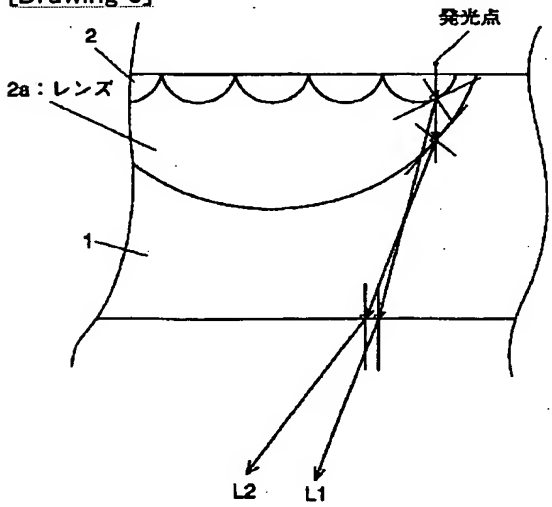
[Drawing 1]



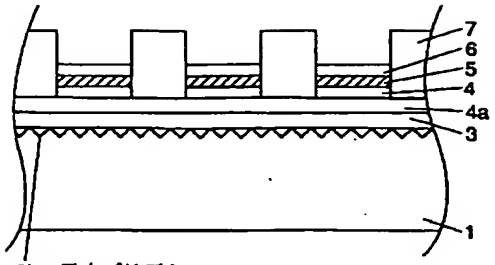
[Drawing 2]



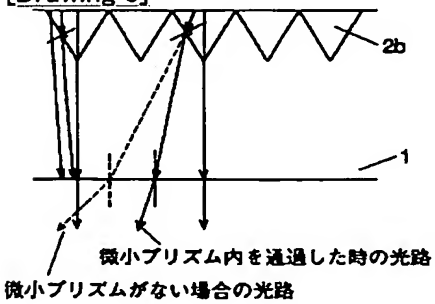
[Drawing 3]



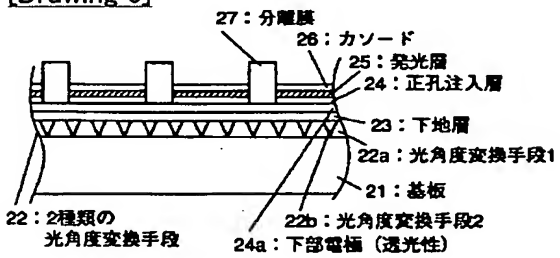
[Drawing 4]



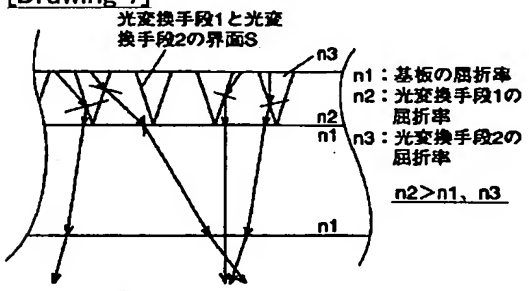
[Drawing 5]



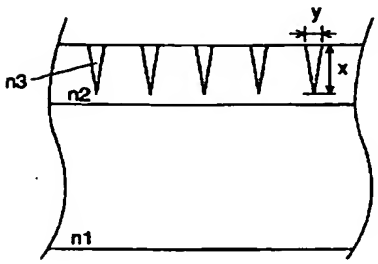
[Drawing 6]



[Drawing 7]



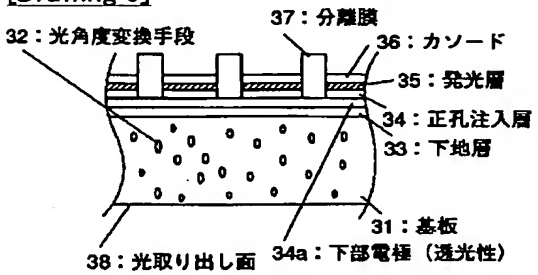
[Drawing 8]



x>y

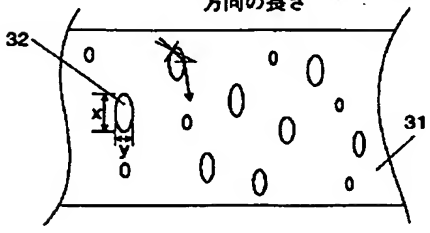
x：光変換手段2の深さ方向の長さ
y：光変換手段2の幅方向の長さ

[Drawing 9]

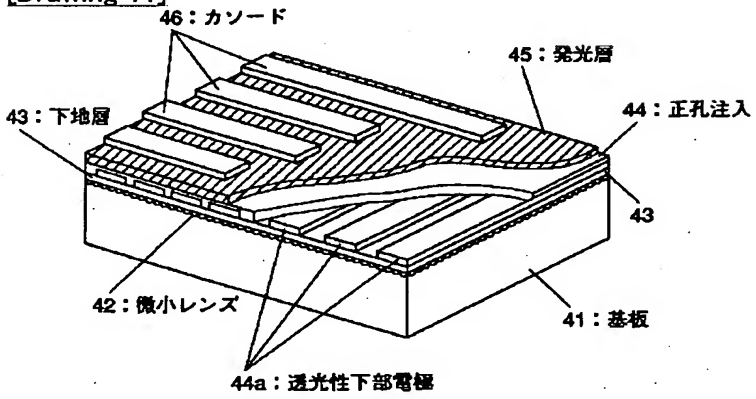


[Drawing 10]

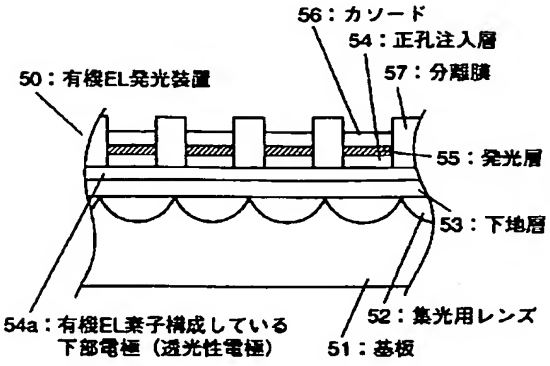
x：光角度変換手段の基板方向の長さ
y：光角度変換手段の基板方向の長さ



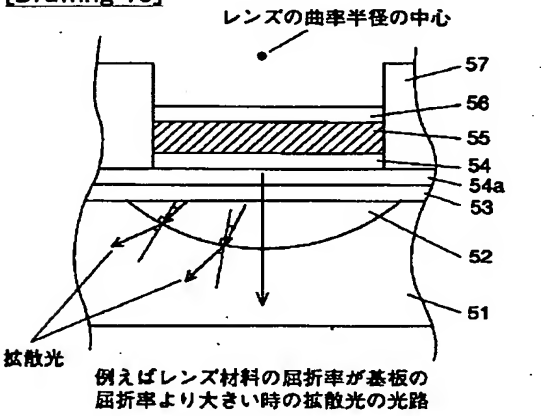
[Drawing 11]



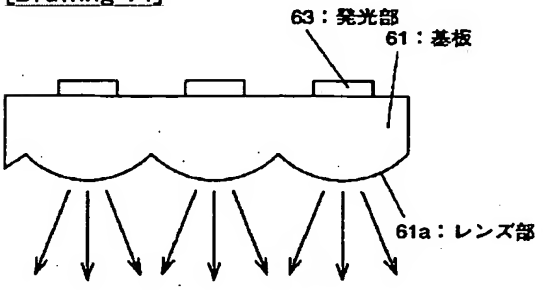
[Drawing 12]



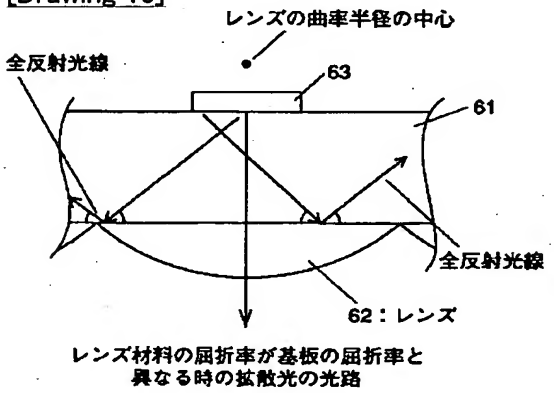
[Drawing 13]



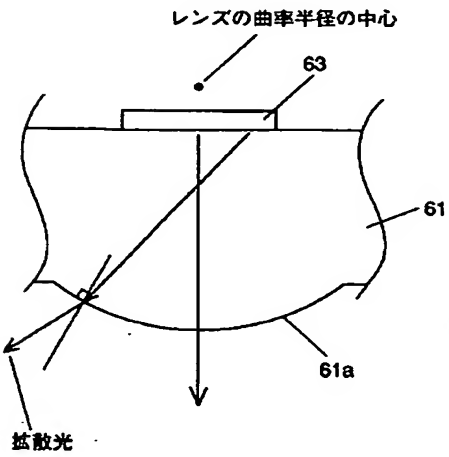
[Drawing 14]



[Drawing 15]



[Drawing 16]



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